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Status of some poorly known lichen species from the genus *Lecanora* (lichenized *Ascomycota*) in Poland

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Abstract — Taxonomic and chorological notes on four *Lecanora* species, misidentified or poorly known in Poland, are presented. *L. aitema* is reported from Poland for the first time; its status and previous reports in the country are discussed. *L. phaeostigma,* practically known only from historical publications, appears to be quite frequent in the Polish Carpathians. The current status of poorly known *L. ramulicola* is presented here based on revised literature and herbarium data. No specimen of *L. cadubriae* has been confirmed in Polish collections and all reports of this species from Poland, in fact, refer to *L. ramulicola*. Because of the misidentifications and nomenclatural confusion, *L. cadubriae* should be excluded from the list of Polish lichens. The taxonomy, nomenclatural remarks, chemistry, habitat requirements, and distribution of all taxa are discussed.

Key words — lichenized fungi, fungal diversity, chorology

Introduction

The lichenized fungi *Lecanora ramulicola* and *L. phaeostigma* have been generally considered rare in Poland. However, intensive field studies carried out by the first and third authors in large coniferous forests located in the Western Carpathians and the northern part of Poland revealed them to be quite common in this country. Moreover, detailed studies of herbarium materials referring to the *Lecanora symmicta*-group from the five biggest Polish collections show

that they had been collected in the past quite frequently but, for nomenclatural or taxonomic reasons, had never been published. In order to clarify this issue we initially focused only on these two species. During the study, however, we also found *L. aitema*, which has never been reported from Poland. In addition, we were interested in the possible occurrence of true *L. cadubriae* in this country, something that was unclear because of nomenclatural confusion; it was formerly synonymized in the Polish literature with both *L. ramulicola* and *L. phaeostigma*. Thus, here we elucidate the current status of *L. aitema*, *L. cadubriae, L. phaeostigma*, and *L. ramulicola* in Poland.

Materials & methods

The studied material originated from the following Polish herbaria: GPN, KRA, KRAM, KRAP, and UGDA. The morphology and anatomy of the specimens were examined using standard microscopic techniques. Secondary substances were analyzed by TLC (in solvents A, B, and C) according to the methods of Orange et al. (2001). Unknown fatty acids observed in *Lecanora ramulicola* samples were compared with angardianic/roccellic acid (extracted from *Lepraria caerulescens* (Hue) Botnen & Øvstedal), jackinic/rangiformic and norjackinic/norrangiformic acids (extracted from *Cladonia rangiformis* Hoffm. and *Lepraria jackii* Tønsberg). The localities are listed and mapped in the modified ATPOL grid square system (Cieśliński & Fałtynowicz 1993, see also Kukwa et al. 2002). The following abbreviations are used in the citation of localities: NP – National Park; fd. – forest district; fs. – forest section; vill. – village; vall. – valley; sl. – slope.

The species

Lecanora aitema (Ach.) Hepp PLATE 1A

SPECIMENS EXAMINED — POLAND, Carpathians: [Gd-17] – Pasmo Babiogórskie range, Krowiarki pass, alt. ca 1020 m, on horizontal surface of spruce snag, 22.06.1965, Nowak (KRAM-L–15917); [Gd-27] – Pasmo Babiogórskie range, Polica range, Zubrzyca Górna vill., Syhlec vall., alt. ca 900 m, on decaying stump, 23.06.1965, Nowak (KRAM-L–17168); [Ge-12] – Beskid Wyspowy Mts., Mogielica Mt., alt. ca 1170 m, on wood of decaying spruce stump, 06.08.1966, Nowak (KRAM-L–4630); [Ge-21] – Gorce Mts., N sl. of Czoło Mt., alt. 1200 m, on horizontal surface of *Picea abies* snag in well-lit place within upper mountain spruce forest, 30.07.1967, Glanc (KRAM-L–29696).

Lecanora aitema has not yet been reported from Poland, perhaps due to its unclear taxonomic status. Specimens of *L. aitema* were frequently considered to represent darker forms of *L. symmicta,* since these taxa differ essentially by apothecial pigmentation alone. The taxonomic status of *L. aitema* needs molecular resolution, but currently more and more lichenologists treat this taxon as a separate species (see below). A revision of some Polish collections of

'*L. symmicta*' shows that several of them have almost exclusively dark, blackish-grey, blackish-brown, convex to subglobose apothecia (Plate 1A) and a slightly greenish thallus containing usnic acid and zeorin. The anatomical characters of the apothecia agree well with those described by Wirth (1995) for *L. symmicta* var. *aitema* and by Edwards et al. (2009) for *L. aitema*. We therefore decided to report *L. aitema* as new for Poland. Some Polish specimens originally labeled *L. symmicta* var. *aitema* are, in fact, *L. ramulicola*. It is interesting that we found only old specimens of *L. aitema* in the herbarium collections of *L. symmicta;* recent collections have not been made despite intensive field studies.

Chemistry — Usnic acid, zeorin.

Ecology and distribution in Poland — The old collections show that *L. aitema* occurs on hard wood of conifers, mostly on horizontal surfaces of spruce stumps within upper mountain spruce forests in the Carpathians. This corresponds well with known ecological preferences of the species mentioned by Edwards et al. (2009). Accompanying species include: *Cladonia* spp., *Biatora pullata*, *Lecanora* sp., *Micarea denigrata*, *Parmeliopsis ambigua*, and *Xylographa parallela*.

World distribution — The precise distribution of this species is not known since its taxonomic position at the species level has sometimes been questioned (see, e.g., Nimis 1993). Often, this taxon has been treated as *Lecanora symmicta* var. *aitema* (Ach.) Th. Fr., *L. symmicta* var. *saepincola* (Ach.) Nyl., or *L. aitema*. *Lecanora aitema* has been synonymized with *L. symmicta* (Ach.) Ach. and, under the latter name, it was mentioned in several national and regional checklists (Wirth 1995, Pišút et al. 1996, Ciurchea 1998, Hafellner & Türk 2001, Bielczyk 2003, Fałtynowicz 2003, Clerc 2004, Mayrhofer et al. 2005, Kossowska 2006). The name *L. symmicta* var. *aitema* has also been incorrectly used for *L. ramulicola*. For these reasons, a re-examination of *L. symmicta* s. l. collections is required to uncover the real global distribution of *L. aitema*.

Distributional data presented here include only reports of *L. aitema* or *L. symmicta* var. *aitema*, as these most probably refer to this taxon. As suggested by Nimis (1993), *L. aitema* appears to be widespread, at least in boreal and montane European regions. Indeed, it is reported from Greenland (Alstrup et al. 2009), the Czech Republic (Liška et al. 2008), Denmark (Søchting et al. 2007), Germany (Scholz 2000, Kanz et al. 2005, Dolnik & Neumann 2009), Great Britain (Smith et al. 2009), Ireland (Seaward 1994), Italy (Nimis 1993), the Netherlands (Aptroot et al. 2004), Fennoscandia (Santesson et al. 2004), and the European part of Russia (Hermansson et al. 1998). Esslinger (2009) has also reported *L. aitema* for North America.

Lecanora cadubriae (A. Massal.) Hedl. Plate 1B

Exsiccatae examined — Lichenes Alpinum 287: AUSTRIA, Steiermark, Schladminger Tauern, alt. ca 1350 m, an *Larix decidua*, 09.07.1973, Poelt (KRAM-L–25797); 318: Austria, Kärnten, Tauren, Kreuzeck-Gruppe, alt. ca 1850 m, an Stämmen von *Larix decidua* am Waldrand, 15.07.1978, Wirth & Hertel (KRAM-L–25827); 376: ITALY, Sudtirol: Zillertaler Alpen, Riesenferner-Gruppe, alt. 1850 m, an der Stamm-Basis einzeln am Hang stehender *Larix decidua*, 18.10.1979, Hertel (KRAM-L–25888); Rabenhorst, Lichenes europaei 731 & Massal. Lich. Ital. exs. N. 332!: Italy, Riva, sulla corteccia dei

Larici in varie localita, 1864, Abbé Carestia (KRA-17702); Lichenes Slovakiae Exsiccati 35: SLOVAKIA, Liptovské Tatry, ad corticem Laricis deciduae in monte Klinovate, alt. ca 1300 m, 10.08.1963, Vězda (KRAM-L–25902).

In the Polish literature (Bielczyk 2003), '*Lecanora cadubriae*' was synonymized under the illegitimate name *Lecidea ramulicola* H. Magn. published in 1952 (see Printzen & May 2002). The name '*Lecanora phaeostigma*' was also erroneously used as a synonym of *L. cadubriae* (Fałtynowicz 2003, Kossowska 2006) and it is probable that some published Polish reports of *L. cadubriae* refer to *L. phaeostigma*. However, most of the reported Polish samples of '*L. cadubriae*' appear to represent morphological forms of *L. ramulicola* with less developed apothecia than usual and a thick, cracked thallus (see under *L. ramulicola*). The characteristic secondary substances for *L. cadubriae* have not been detected in any available Polish specimen originally filed under this name. Thus its real occurrence in Poland is questionable. *Lecanora cadubriae* has been collected many times close to Poland in the Slovak Tatra Mts. (Lisická 2005). Considering this and other reports from Central Europe (e.g., Kanz et al. 2005, Liška et al. 2008) the Polish Tatra Mts. is the most probable area to discover the species for the national lichen biota.

Chemistry — P+ orange, K+ yellow turning to orange; TLC: norstictic acid (major), ±stictic and ±salazanic acids (accessory substances).

World distribution — The general distribution of *Lecanora cadubriae* extends from the boreal zone (including North America and Greenland) to the montane areas of Europe (Nimis 1993, Thomson 1997, Alstrup et al. 2009, Smith et al. 2009). The species appears in numerous European checklists and catalogues, being sparsely recorded inter alia from: the British Isles (Smith et al. 2009), the Nordic (Søchting & Alstrup 2002, Santesson et al. 2004) and the Baltic countries (Randlane & Saag 1999, Jüriado et al. 2003), Central Europe (Scholz 2000, Hafellner & Türk 2001, Kanz et al. 2005, Lisická 2005, Liška et al. 2008), the Balkans (Mayrhofer et al. 2005, Knezevic & Mayrhofer 2009) and the alpine regions of Italy and Slovenia (Nimis 1993, Suppan & Mayrhofer 2002). Furthermore, outside Europe and North America, the species was reported from Syria (John et al. 2004).

It seems that the lichen is rare but rather widespread in the Northern Hemisphere. It should be taken into account, however, that the name '*Lecanora ramulicola*' has sometimes been treated erroneously as a synonym of *L. cadubriae* and that some records of *L. cadubriae* refer, in fact, to *L. ramulicola*.

Lecanora phaeostigma (Körb.) Almb. Plate 1C

Selected specimens examined — (if not otherwise stated, on wood of *Picea abies* within upper mountain spruce forest). POLAND, Carpathians: [Gd-16] – Western Beskidy Mts., Babia Góra Massif, Babia Góra NP, fs. no. 21A, 49°35'04.6"N / 19°32'15.3"E, alt. 1160 m, 03.07.2009, Czarnota 6156 (GPN); [Gd-17] – Babia Góra Massif, Babia Góra NP, fs. no. 18a, SE sl. of Sokolica Mt., 49°35'12.3"N / 19°34'07.8"E, alt. 1230 m, 08.06.2009, Czarnota 6044 (GPN); ibid., fs. no. 25, S sl. of Sokolica Mt., 49°35'02.3"N / 19°33'56.3"E, alt. 1265 m, 01.07.2009, Czarnota 6093 (GPN); [Gd-26] – Babia Góra Massif, Babia Góra NP, fs. no. 26h, S sl. of Kępa Mt., 49°34'07.7"N / 19°33'01.9"E, alt.

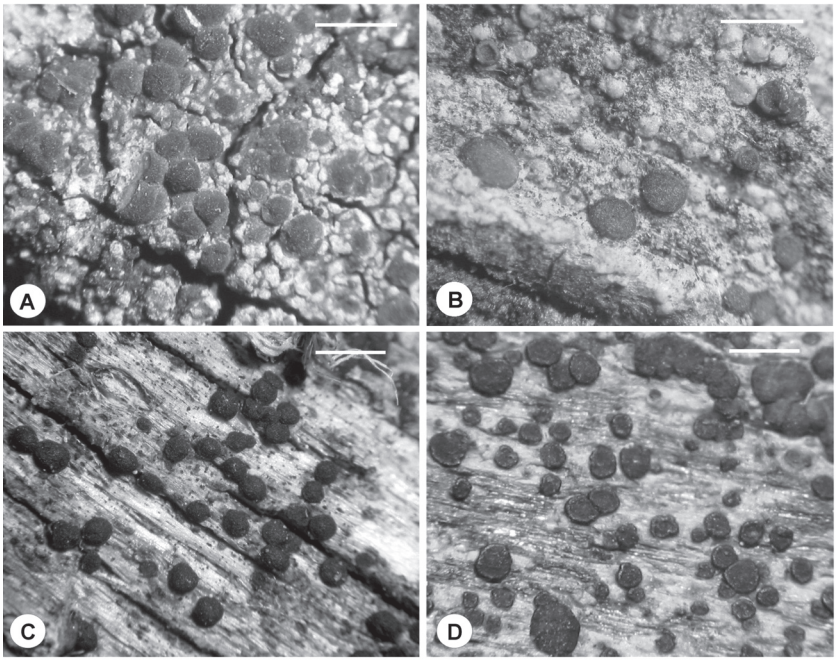

Plate 1. Habits of discussed *Lecanora* species. A – *L. aitema* (KRAM-L-17168); B – *L. cadubriae* (KRA-17702); C – *L. phaeostigma* (GPN 6069); D – *L. ramulicola* (GPN 5771). Scale bars = 1 mm.

1365 m, 17.07.2009, Czarnota 6069 (GPN); [Gd-27] – Babia Góra Massif, Babia Góra NP, fs. no. 26h, S sl. of Kępa Mt., 49°34'07.8"N / 19°33'12.8"E, alt. 1290 m, 17.07.2009, Czarnota 6079 (GPN); [Ge-11] – Western Beskidy Mts., Gorce Mts., Gorce NP, W sl. of Gorc Kamienicki Mt. near Spaleniec stream, alt. 820 m, 27.03.2002, Czarnota 2754 (GPN); [Ge-20] – Gorce Mts., vall. of Lepietnica stream, W of Długie Młaki glade, alt. 1160 m, 12.09.1966, Glanc (GPN/5368; Ex KRAM-L–39562) and on bark of *Picea abies*, 12.09.1966, Glanc (KRAM-L–39186, as *Lecidea cadubriae*); ibid., Bukowina, Dolina Robowa vall., alt. 715 m, on bark of *Picea abies* within *Abieti-Piceetum*, 21.07.1965, Glanc (KRAM-L–39187, as *Lecidea cadubriae*); [Ge-21] – Gorce Mts., Gorce NP, fs. no. 136a, Dolina Kamienicy vall. above Mały Borek region, 49°33.619'N / 20°09.098'E, alt. 980 m, within *Abieti-Piceetum*, 06.09.2008, Czarnota 5723 (GPN); ibid., N sl. of Turbacz Mt. below the top, alt. 1280 m, 25.05.2001, Czarnota 5369 (GPN); ibid., W sl. of Mostownica range, alt. 1220 m, 23.07.2007, Czarnota 5458b (GPN); ibid., fs. no. 35d, E sl. of Czoło Mt., 49°33.160'N / 20°07.325'E, alt. 1200 m, 14.10.2008, Czarnota 5797 (GPN); [Ge-60] – Tatra Mts., High Tatra Mts., Tatra NP, NW sl. of Żabia Grań Mt. near the border Pl-Sk, alt. 1500 m, 09.07.2002, Czarnota 2874 (GPN, as *Lecidea hypopta*).

There are practically only historical records of *Lecanora phaeostigma* within Poland (Körber 1855, Stein 1879, Eitner 1901). These records accepted here are based only on the original and detailed descriptions included in Körber's and Stein's works. Stein included *Biatora phaeostigma* Körb., a basionym of

L. phaeostigma, as a synonym of *B. obscurella* (Sommerf.) Arnold. According to Zahlbruckner (1925), *B. obscurella* was based on *Lecidea pellucida* var. *obscurella* Sommerf. described in 1826 and raised to the species level as *Lecidea obscurella* (Sommerf.) Nyl. by Nylander in 1866. Hedlund (1892) mentioned this species as *Lecanora obscurella* (Sommerf.) Hedl. [nom. illegit. as a later homonym of *Lecanora obscurella* (J. Lahm.) Nyl. 1878], but surprisingly *Biatora obscurella* has recently been included in the synonymy of *Biatora tetramera* (De Not.) Coppins (Index Fungorum 2010), a species that is not congeneric with *Lecanora phaeostigma* in a current sense. In fact, the nomenclature of the taxa, not to mention the taxonomy, is highly complicated and warrants a separate study.

Chemistry — 2-methylene-3-carboxy-18-hydroxynonadecanoic acid.

Ecology and distribution in Poland — *L. phaeostigma* grows frequently on hard wood of decorticate *Picea abies* trunks and, rarely, on the bark of usually dead spruces within upper montane spruce forest (*Plagiothecio-Piceetum*) and montane spruce-fir forest (*Abieti-Piceetum*) at altitudes between 820–1500 m. It prefers semi-shaded parts of trunks but tolerates well-lit localities within extensive insect damaged stands. Accompanying species usually include *Calicium abietinum, C. glaucellum*, *C. trabinellum*, *Fuscidea pusilla*, *Lecanora ramulicola*, *L. subintricata*, *Lecidea leprarioides*, *Parmeliopsis ambigua*, *Pycnora sorophora*, and *Strangospora moriformis*.

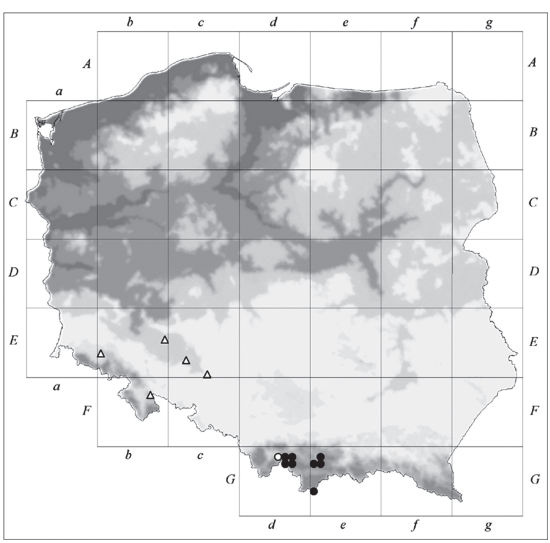

Plate 2. Known distribution of *Lecanora phaeostigma* in Poland given in ATPOL grid square system (100×100 km): △ – historical data; ○ – recent record; ● – new findings.

The name of *Lecanora phaeostigma* has been reported recently from Poland only twice – from a locality in the Western Beskidy Mts. (Nowak 1998) and from the Polish Eastern Carpathians in the Low Bieszczady Mts. (Kiszka & Kościelniak 1998). Unfortunately, there are neither detailed localities nor any ecological data given in the latter report. Moreover, the species was omitted in later lists compiled for that region (Kościelniak & Kiszka 2003, Kościelniak 2004), from which it has not been reported since 2004. The occurrence of *L. phaeostigma,* however, is possible in the Polish Bieszczady Mts. since it is known in the Ukrainian part of the Eastern Carpathians (Kondratyuk et al. 1998). Plate 2 shows the known distribution of the species including the old reports cited above.

World distribution — *L. phaeostigma* is regarded as a rare but rather widespread species in Europe. It was reported throughout the continent from Fennoscandia, Western Russia, and Estonia (Randlane & Saag 1999, Jüriado et al. 2003, Santesson et al. 2004, Urbanavichus et al. 2008), Romania and Bulgaria (Ciurchea 1998, Mayrhofer et al. 2005), Germany, Austria, and Switzerland (Scholz 2000, Hafellner & Türk 2001, Clerc 2004, Kanz et al. 2005, Pfefferkorn-Dellali & Türk 2005), and France and Italy (Clauzade & Roux 1985, Nimis 1993). Close to Poland it is found in the Czech Republic and Ukraine (Kondratyuk et al. 1996, Kondratyuk et al. 2003, Liška et al. 2008). Outside Europe, the species was recorded from Mongolia (Biazrov 2009).

Lecanora ramulicola (H. Magn.) Printzen & P.F. May Plate 1D

≡ *Lecidea saepincola* var. *ramulicola* H. Magn.

≡ *Lecidea ramulicola* (H. Magn.) Hillm.

Selected specimens examined — (if not otherwise stated, on wood or bark of conifers: *Pinus sylvestris* or *Picea abies*). POLAND: [Ac-35] – Wybrzeże Słowińskie coast, Szklana Huta fd., fs. no. 164b, 2.5 km E of Lubiatowo vill., on dead twigs of *Betula pendula*, 18.09.2000, Kowalewska (UGDA-L– 15484); ibid., fs. no. 109f, 3 km NE of Lubiatowo vill., on *Betula pendula*, 9.10.2000, Kowalewska (UGDA-L–15488); [Ac-36] – Wybrzeże Słowińskie coast, Białogóra nature reserve, 27.07.1982, Fałtynowicz (UGDA-L–1461); Białogóra fd., fs. no. 25g, 1 km NW of Białogóra vill., on *Betula pendula*, 10.10.2000, Kowalewska (UGDA-L–15490); ibid. fs. no. 29b, 2 km NW of Białogóra vill., on *Betula pendula*, 25.08.2000, Kowalewska (UGDA-L–15481); ibid., fs. no. 91g, 3 km W of Białogóra vill., on dead twigs of *Betula pendula*, 12.10.2000, Kowalewska (UGDA-L–15493); [Ac-38] – Wybrzeże Słowińskie coast, peat-bog Bielawskie Błoto, 30.09.1981, Fałtynowicz (UGDA-L–1401, as *L. symmicta*); [Ac-41] – Wybrzeże Słowińskie coast, Słowiński NP, Radek near Czołpino, 30.08.1988, Fałtynowicz (UGDA-L–3978, KRAM-L–22458, both as *L. symmicta*); [Ac-61] – Wysoczyzna Damnicka plateau, 1-2 km SE of Damnica vill., 20.11.1987, Fałtynowicz & Miądlikowska (UGDA-L–3752, as *L. symmicta*); [Bc-16] – Pojezierze Południowopomorskie lakeland, Bory Tucholskie forest, peat-bog near Drzędno Lake, 54°03'46"N / 18°00'34"E, 29.07.1983, Fałtynowicz (UGDA-L–1705, as *L. symmicta*); [Bc-25] – Bory Tucholskie forest, Grzybowski Młyn fd., fs. no. 365b, 2.5 km NE of Szludron village, 15.09.2002, Kowalewska (UGDA-L–15503); ibid., 1 km NW of Szludron village, 19.06.2002, Kowalewska (UGDA-L–15500); ibid., 0.5 km SW of Loryniec vill., 15.09.2002, Kowalewska (UGDA-L–15506); [Bc-26] – Bory Tucholskie forest, Lipa vill. at E shore of Wdzydze Lake, 53°59'24"N / 17°56'25"E, 13.09.2006,

Czarnota 5132 (GPN); [Bc-31] – Równina Charzykowska plain, „Niedźwiady" peat-bog nature reserve near Lipczynek vill., 26.07.1987, Fałtynowicz (KRAM-L–21769, UGDA-L–3108, both as *L. symmicta*); [Bc-65] – Bory Tucholskie forest, Biała fd., fs. no. 129, 16.08.2002, Czarnota 3077 (GPN); [Cg-64] – Nizina Północnopodlaska lowland, Równina Bielska plain, Białowieża Primeval forest, Hajnówka fd., fs. no. 572, 11.08.2002, Czarnota 3021 (GPN); [Fd-47] – Wyżyna Krakowsko-Częstochowska upland, Wyżyna Olkuska upland, Skalskie near Olkusz town, 06.04.1956, Nowak (KRAM-L–2556, as *Lecidea ramulosa*); [Fd-48] – Wyżyna Olkuska upland, Ojców vill., 01.05.1956, Nowak (KRAM-L–2446, as *Lecidea ramulicola*); [Fd-66] – Kotlina Oświęcimska depression, Rozkochów on Wisła River, 31.03.1960, Nowak (KRAM-L–6855, as *Lecidea ramulicola*); [Fd-93] – Western Carpathians, Western Beskidy Mts., Beskid Mały Mts., Przegibek pass, alt. ca 660 m, 23.08.1960, Nowak (KRAM-L–7583, as *Lecidea ramulicola*); [Fd-96] – Beskid Mały Mts., Łysa Góra Mt., alt. ca 510 m, close to the hiking track from Wadowice to Leskowiec, 19.04.1961, Nowak (KRAM-L–7065, as *Lecidea ramulicola*); [Fe-96] – Western Carpathians, Pogórze Rożnowskie foothills, Górowa vill., alt. 420 m, 11.09.1970, Kozik (KRAP, dupl. in KRA, as *L. cadubriae*); [Ff-03] – Kotlina Sandomierska basin, Puszcza Sandomierska forest, fs. no. 187, between Grębów and Stalowa Wola town, 07.09.1982, Kiszka (KRAP, as *Lecidea ramulicola*); [Ff-13] – Puszcza Sandomierska forest, Krawce fd., fs. no. 91, 28.09.1982, Kiszka (KRAP, as *Lecidea ramulicola*); [Fg-22] – Kotlina Sandomierska basin, Puszcza Solska forest, near Huta Różaniecka vill., 28.07.1984, Kiszka & Piórecki (KRAM-L, as *Lecidea ramulicola*); [Fg-23] – East Roztocze, Puszcza Solska forest, near Narol town, 20.07.1984, Kiszka (KRAM-L, as *Lecidea ramulicola*); [Gd-16] – Western Beskidy Mts., Beskid Żywiecki Mts., Babia Góra Massif, Babia Góra NP, Mała Babia Góra Mt., alt. 1460 m, 10.08.2001, Węgrzyn 379 (KRA, as *L. symmicta*); ibid., Babia Góra NP, fs. no. 24a, 49°35'10.5"N / 19°30'52.3"E, alt. 1230 m, 02.07.2009, Czarnota 6130 (GPN); [Gd-17] – Babia Góra Massif, Babia Góra NP, Sokolica Mt., alt. 1300 m, 30.08.2000, Węgrzyn 192 (KRA, as *L. symmicta*); ibid., fs. no. 25a, 49°35'01.0"N / 19°33'54.6"E, alt. 1265 m, 01.07.2009, Czarnota 6102 (GPN); ibid., fs. no. 18b, NE sl. of Sokolica Mt., 49°35'19.5"N / 19°33'39.9"E, 10.06.2009, Czarnota 5999 (GPN); Beskid Żywiecki Mts., Polica Mt., alt. ca 1300 m, 8.07.1965, Nowak (KRAM-L–15145, as *L. symmicta*); [Gd-58] – Tatra Mts., West Tatra Mts., Wielkie Koryciska, alt. ca 1000 m, 19.06.1998, Bielczyk (KRAM-L–44435, as *L. symmicta*); [Gd-59] – Obniżenie Orawsko-Podhalańskie depression, Rów Podtatrzański depression, Dolina Lejowa vall., Polana Biały glade, 49°17'02"N / 19°50'48"E, alt. 900 m, 17.07.2004, Śliwa 3257 (KRAM-L–54579, as *L. symmicta*); [Ge-11] – Western Beskidy Mts., Gorce Mts., Gorce NP, N sl. of Kudłoń Mt., alt. 1130 m, 24.08.1967, Glanc (KRAM-L–48422, as *L. symmicta*); ibid., vall. of Turbacz stream below Turbaczyk Mt., alt. 870 m, 04.11.1994, Czarnota 684 (GPN, as *L. cadubriae*); ibid., W sl. of Kudłoń Mt. close to Pustak glade, 49°33'14"N / 20°10'13"E, alt. 1200 m, 11.07.2008, Czarnota 5371 (GPN); ibid., vall. of Rosocha stream, alt. 780 m, 05.12.1994, Czarnota 672 (GPN, as. *L. symmicta*); [Ge-20] – Gorce Mts., by hiking track from Turbacz Mt. to Nowy Targ-Kowaniec, 12.09.1964, Glanc (KRAM-L–28344, as *Lecidea helvola*); [Ge-21] – Gorce Mts., Gorce NP, Dolina Łopusznej vall., below Gabrowska glade, alt. 1240 m, 27.08.1968, Glanc (KRAM-L–40264, as *L. symmicta*); ibid., fs. no. 136c, vall. of Kamienica stream below Jaworzyna glade, 49°33.415'N / 20°09.244'E, alt. 1075 m, 09.09.2008, Czarnota 5638 (GPN); ibid., fs. no. 35a, W sl. of Mostownica Mt., 49°33.302'N / 20°07.318'E, alt. 990 m, 08.10.2008, Czarnota 5818 (GPN); ibid., fs. no. 184b, W of Gabrowska glade, 49°32.624'N / 20°08.402'E, alt. 1240 m, 29.08.2008, Czarnota 5762 (GPN); [Ge-60] – High Tatra Mts., Tatra NP, N ridge of Żabia Grań Mt. on the border of Pl-Sk, alt. 1570 m, 09.07.2002, Czarnota 2921 (GPN);

ibid., ridge of Siedem Granatów Mt., 49°12'39.6"N / 20°05'25.0"E, alt. 1600 m, mountain stone pine and spruce forest, on *Pinus cembra*, 15.07.2006, Węgrzyn 3195 (KRA).

There are few literature records of *L. ramulicola* in Poland (Hillmann & Grummann 1957, Nowotarska 1976, Kozik 1977, Kiszka 1979, 1981a, b; Cieśliński et al. 1982 – all reported as *Lecidea ramulicola*; Printzen & May 2002, Kiszka 2008, Kubiak 2008 – reported as *Lecanora ramulicola*). Moreover, Nowak & Tobolewski (1975) mentioned that the species then occurred in the lowland and Carpathian foothills but did not include any detailed localities. Due to the nomenclatural and taxonomic confusion concerning this taxon between 1982 and 2002, there was a twenty-year-old gap in any information on *L. ramulicola* in Poland. Kiszka (1993) reflected that situation in Polish lichenology when he included *Lecidea ramulicola* as a synonym of *Lecanora cadubriae*. Since 1993, specimens of *L. ramulicola* have been usually cited in Polish literature exclusively (and erroneously) as *L. cadubriae* (e.g., Kiszka 1998, Kiszka & Grodzińska 2004). During our revision we found many specimens of *L. ramulicola* labeled as *L. cadubriae*. Some were originally labeled correctly as *Lecidea ramulicola* but later were annotated as *L. cadubriae* and thus never published. Although Printzen & May (2002) finally resolved the nomenclatural problems surrounding these species, distributional data of *Lecanora ramulicola* in Poland remained hidden under '*L. cadubriae*' (e.g., Bielczyk 2003), a species that probably has never been collected in Poland (see under *L. cadubriae*). Our revision showed also that *Lecanora ramulicola* was often misidentified as *Lecanora symmicta* (including *L. symmicta* var. *aitema*).

Taxonomical remarks — Darker forms of *Lecanora ramulicola* resemble *L. aitema* because of the similar apothecial pigmentation. The biatorine apothecia of *L. ramulicola*, however, are usually distinctly marginate, ±glossy and often concave when immature (Plate 1D). Moreover, the taxa are chemically distinct. According to Printzen & May (2002), *L. ramulicola* produces atranorin as a major compound together with one unknown substance. Some paler, mature, immarginate forms of *L. ramulicola* often resemble *L. symmicta*, but these species differ in the colour of thallus: distinctly ash-grey in *L. ramulicola* (because of the predominance of atranorin) and slightly yellowish green in *L. symmicta* (because of abundant usnic acid). In addition, the areoles of *L. ramulicola* are usually more coherent.

Printzen & May (2002) present an excellent description, and they discuss the affinities and differences between other taxa in the *Lecanora symmicta*-group (forming biatorine, mature apothecia and containing usnic acid as a major compound).

Chemistry — Atranorin, ±usnic acid, 1 or rarely 2 unidentified fatty acids. Most of the analyzed specimens contain usnic acid, but often, only small

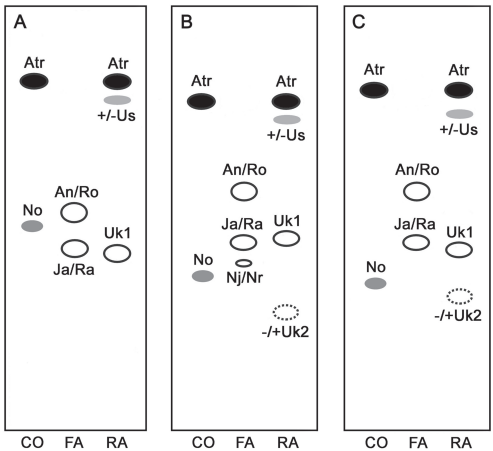

Plate 3. Schematic diagram of chromatograms showing substances detected in *Lecanora ramulicola*, in solvent systems A, B, and C. CO – control; FA – selected fatty acids; RA – *L. ramulicola*. Compounds: An/Ro – angardianic/roccellic acid; Atr – atranorin; Ja/Ra – jackinic/rangiformic acid; Nj/Nr – norjackinic/norrangiformic acid; No – norstictic acid; Uk1 and Uk2 – unknown fatty acids; Us – usnic acid.

amounts of this substance were detected. Unknown fatty acids differ from substances mentioned in the Material and methods section (see Plate 3). The first fatty acid (Rf classes A3-4, B4, and C4-5) is always produced whereas the second fatty acid (Rf classes A not detected, B2-3, C3) occurs sporadically. Only a dozen of the examined specimens contained trace amounts of this satellite substance.

Ecology and distribution in Poland — *Lecanora ramulicola* is widespread in Poland from the Baltic coast (Printzen & May 2002) to the Tatra Mts., and from close to sea level to the upper timberline at an altitude of 1500 m. Most of its known localities, however, lie to the south in the Western Carpathians. It usually grows there on the hard wood of branches and decorticate trunks of *Picea abies* within the upper montane spruce forest *Plagiothecio-Piceetum* or, more rarely, in the Carpathian beech forest of the lower montane belt. A few collections have also been made from the bark of conifers (e.g., *Picea abies, Pinus sylvestris*, *Abies alba*). It prefers well-lit places within dead stands destroyed by bark beetles and open localities at the edges of forest gaps. Large lowland pine forests are also favoured habitats. There, *L. ramulicola* grows both on bark and wood of *Pinus sylvestris* and frequently on the dead twigs of *Betula pendula*.

The known distribution of *L. ramulicola* in Poland is shown in Plate 4. Localities from Upper Silesia mentioned by Kiszka (1993) for *Lecanora cadubriae*

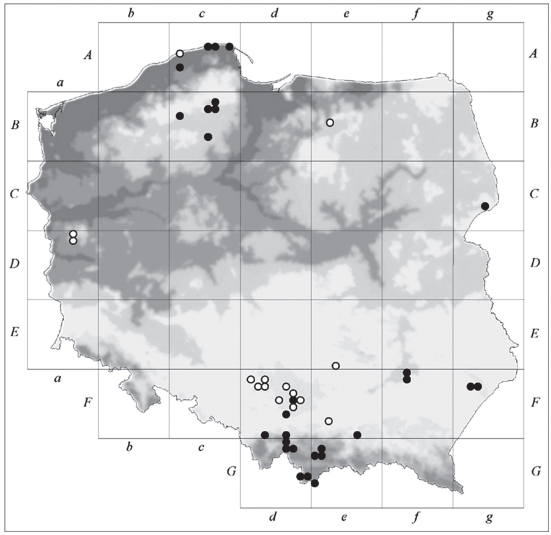

Plate 4. Known distribution of *Lecanora ramulicola* in Poland given in ATPOL grid square system (100×100 km): ○ – previously reported localities; ● – new findings.

have been included here without taxonomic revision, since the specimens clearly refer to *Lecidea ramulicola*. Anyway, revision of those materials was impossible because the collection was unavailable in KRAP.

World distribution — *L. ramulicola* was an overlooked lichen in the past and its general distribution is not yet well known. Printzen & May (2002) reported it from some central European countries (the Czech Republic, Poland, Germany) and North America (Canada and the U.S.A.). Later the species was reported from the Slovak part of the Tatra Mts. (Lisická 2005), the Iberian Peninsula (Pérez-Ortega & Printzen 2007), Western Russia (Kuznetsova et al. 2007) and some additional localities in Germany (Kanz et al. 2005, Dolnik & Neumann 2009).

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